On the accuracy of export growth in Argentina, 1870-1913

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1.- Introduction

Argentina became part of the global economy in the last quarter of the 19th century largely as the result of the export of a small range of primary products along with the attraction of external labor and capital flows. The favorable conditions of this international expansion during the *Belle Époque* were brusquely interrupted by the First War World and its aftermath. Argentine export growth before the First World War is considered one of the most relevant variables in order to understand the main characteristics of Argentina's long-run modern economic growth properly. Primary products led this international boom but the historiography has yet to agree about the level and speed of the export growth, the Baring crisis impact and on the relative prominence of the role of cattle or crop commodities during the period. The lack of accuracy of the official export series, especially the relative unitary values used, lies behind some of the controversies and doubts of the historiography when addressing the causes and consequences of Argentina's international convergence.

Most specialists in this period have used partial statistics for the volume of commodity exports in their analysis of Argentine expansion during the years 1870-1913 because they did not trust the country's official export figures for the period –see Diaz Alejandro (1970); Di Tella-Zymelman (1967); Cortes Conde (1990); Rapaport (1990);

Vazquez Presedo (1971a 1971b).[1] Despite important efforts made by a group of well-known Argentinean economic historians in the 1960s (Cortes Conde, Halperin, Gorostegui, 1965), they decided not to publish this monographic reconstruction of Argentine export series because it was considered to be incomplete and unsatisfactory (some partial results were published later by Dieguez, 1972). In this later work official values (*"valores nominales"*) were corrected by estimating domestic market values (*"valores reales"*), tracing backwards the work done by the *"Dirección General de Aduanas"* from 1910 onwards.[2] There is no consensus about this proposal of a new historical export series and no other serious attempts have been made in the last 40 years.[3]

The present paper will study the accuracy of Argentina's official export figures in order to reconstruct a new current and constant value series for the period 1870-1913. In the next section, we will discuss the literature and the accuracy problems surrounding the monetary units, geographical distribution and, especially, the official export unit values. In the third section, we will study accuracy using two independent tests. Firstly, Argentina's figures for total export values will be contrasted according to their import partners' records, and secondly, official unit export values will be tested according to international market prices. The results show that the hypothesis of an export price bias undervaluation is correct. In the fourth section we will reconstruct a new Argentine

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[1] The most well-known contemporaneous studies of Argentine trade statistics, such as Latzina (1905) or Tornquist (1919), are also critical of the accuracy of the statistics but they do not make any effort to re-evaluate official values. Only Bunge (1918), as discussed below, presented a serious study in this direction for the years 1910-1916 preceding the official works of revaluation made by the *Dirección General de Estadística Argentina*.

[2] From 1910 onwards official values (*valores nominales)* have been commuted by yearly estimated domestic market values (*valores reales*). The last records were also called *"valores de plaza"* and were f.o.b prices estimated yearly by the *Dirección General de Estadística Argentina* according to periodical observations of domestic market prices, see DGE (1937) p. XXIII-XXIV. The new export series elaborated by Cortes Conde et al. (1965) for the years 1864-1963, follows a similar methodology to the DGE using domestic market prices (*valores de plaza*). These results differ from the official export figures by an annual average of 15.6 % during the period 1864 to 1899 (see Dieguez, 1972, note 2, p. 335).

[3] On the other hand, some recent historical compilations, such as Mitchell (2003) or Ferreres (2004), assume that failings in the reliability of the Argentine official export figures are not so serious and present the official export series without even mentioning their accuracy.

export f.o.b price index, based on international price freights and adjusted export tariffs, that allows a new discussion of the country's export growth in line with the corrected importance of cattle and crop export commodities. We finish with some remarks on the relevance of the new series for the discussion of Argentine economic growth during the period and some additional remarks about export price indexes and trend openness.

2.- On the accuracy of Argentina's official export figures

Argentine historical trade records were compiled both for fiscal and statistical information purposes. Nevertheless, in the case of exports (which were usually taxed at lower rates than imports and so had lower incentives for contraband), the literature trusts the records of quantities. This is not the case with official unitary values which the literature assumes were estimated more for fiscal reasons than for statistical purposes and, therefore, frequently failed to reflect market price trends. The discussion in the literature of the bias of Argentina's export series fits this hypothesis based on the existence of a general undervaluation and the fact that there were no incentives to update official values on a yearly basis for tariff reasons.[4]

Official Argentine publications recognize that the most remarkable bias in the export series came from the use of official valuation and differences with respective international market prices. Exports were taxed at lower rates than imports but used the same system of official valuation called "*tarifa de avalúos*". From the first published trade statistics in the *Anuario del Comercio Exterior* in 1864 and, in some cases until 1916, the unitary values used were those of the "*valores de aforo*" (also called "*valores de avalúos*" or "*valores de tarifa*"). Official Argentine statistical yearbooks recognize that they differed significantly from market prices because official values were mainly based on *aforos* and these values were not modified to keep step with market prices.[5]

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[4] The undervaluation hypothesis is discussed by official contemporary statistics and by economic historians. See, respectively, the introduction of *Anuario Estadístico 1913*, and Cortes Conde et al. (1965).

[5] In 1880 the value of taxed exports was 10 times those not taxed (50.8 against 5.6 million pesos), see *Anuario* 1880 p. XVIII. The official publication "*Estadística del Comercio Exterior 1880*", p.17, recognizes that these *"valores de tarifa"* were the main reason for the existence of a low quality trade statistic: *"De aquí se siga que nuestra estadística comercial revista en cuanto a sus valores, cierto carácter*

Official export tariffs were specific, that is were paid based on the volume exported.[6] But they were normally estimated and published "ad valorem" until 1906, when export taxes were abolished. This means that exporters preferred to have a "*valor de aforo* " undervalued in order to appear to be paying more tax than they really were. For the same reason the administration was interested in the opposite situation but traditional export sector lobbies had influence on the administration (*comisión de aforos*). Cortes Conde et. al (1965) suggested, following this argument, that some traditional goods like the "cattle products" in Argentina's exports in the 1870s and 1880s such as *skins, wool, tallow, salted meat,* were probably more undervalued than the "crop products" such as wheat, maize, linseed and flour. According to Cortes Conde et. al (1965), from 1892 onward the pressure of tariffs on cattle exports was moderated significantly and some efforts were made to reduce the distance between the "*valores de aforo*"(official values) and the "*valores de plaza*" (domestic market prices). This situation would improve further after 1906 when export taxes were abolished. Official values were modified to market prices by A.E. Bunge (1918) for the years 1910-1916 before Argentine trade statistics incorporated new annual estimations of "*valores de plaza*" from 1916 onwards. Both estimations have been introduced as official values in export statistics in most of the official retrospective trade publications from 1931 onwards and will be included in our study as part of the official export series to be tested for the years 1910-13.[7]

As mentioned above, a serious attempt at correction of the official Argentine export figures for the years 1864-1916 was made by Cortes Conde et. al (1965). The correction assumed that the quantities were correct and is based on the revaluation of the "*valores de aforo*" of 15 different export products for domestic prices ("*valores de*

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de ficticio…. Nuestra actual legislación aduanera es, pues, enemiga de una buena estadística. Cited by Conde –Halperin and Gorostegui (1965), pp.36-37.

[6] See Latzina (1905) p.4.

[7] From 1931 onwards Argentina's official trade publications are called *"Anuario del Comercio Exterior de la República Argentina correspondiente al año… y noticia sumaria del periodo 1910 a …".*

plaza").[8] The proposal is limited to some specific years because, according to the interpretation of the authors, yearly domestic prices "*valores de plaza*" were introduced from 1892 onwards for most agricultural commodities (wheat, maize, linseed, flour). So, for these products, revaluation is only proposed for the years 1864-1891. On one hand, for the cattle commodities such as raw wool, skins, tallow, salted meat, the official values after 1906 were trusted; on the other hand, the official values for animals, frozen mutton, chilled and frozen beef meat were not trusted until 1916. We think that these criteria should be contrasted with price evidence, but our main disagreement with this seminal work is more related to its general revaluation methodology. From our point of view, the selection of domestic prices ("*valores de plaza*") to correct the official values is questionable. Export commodities were sold according to their quality at international market prices. Many reasons, such as the small dimension of the domestic market, the distortion produced by protection or the different qualities of the products sold on the domestic market in comparison with the international market, allow us to suspect that domestic market prices may be biased in relation with international prices. Furthermore, to be able to compare official values (*valores de aforo*) with domestic prices (*valores de plaza*), it is necessary to introduce, additionally, some controversial decisions about conversion rates from *pesos oro* to *pesos papel*. These rates have long been subject to debate and in consequence represent a potential additional bias.[9]

Before 1881, the monetary unit used in Argentine national statistics is *the "peso fuerte"* which is very close to the *"peso oro"* used from that year to 1930. What is more

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[8] Domestic prices were obtained from *Boletín de la Bolsa de Comercio* and *Boletín de la Bolsa de Cereales* and other national journals. The exception would be *"carne congelada"(frozen beef),* an increasingly important export product from 1885 to 1913. These unitary values were UK c.i.f import values taken from the journal *The Economist*. They translate c.i.f values to f.o.b with a fixed coefficient estimated as 20% for the whole period. Technological changes in transport refrigeration introduced major changes in the freight factor of beef from 35%-40% in the 1880s to 10% before the First World War (see notes on freight factor estimation in the Appendix 3).

[9] There is no agreement about the continuity between conversion rates of the "*peso fuerte*¨and "*pesos oro*" or even concerning the conversion of both to a common monetary unit such as the "*peso papel*". The most widely accepted exchange rate is that of Alvarez (1929), pp.115-120, but some recent works, such as Ferreres (2005), use other alternatives. Cortes Conde et al. (1965), pp. 48-50) notice that the most important commodities exported were valued in gold but some products were valued in local silver currency.

important, however, following Cortes Conde et al. (1965), pp. 47-53, we assume that Argentine international trade transactions were realized in "*pesos oro*" between 1881 to 1930 and in "*pesos fuertes*" before that year. To solve this problem of homogenization before and after 1881, and taking advantage of the fact that we use British prices, we will measure Argentine exports in pounds sterling for the whole period. [10]

It should also be remembered that in the Argentinean case the geographical export distribution was especially contaminated by *"comercio a órdenes"*. The practice of shipping "for orders" was widespread in primary producer countries with high export concentrations in a few commodities and affected by price arbitrage fluctuations on the international market. The Argentine practice was to postpone the decision on how to record the destination of exports with the inclusion of a "*comercio a órdenes*" section in order to decide the final destination of the products later, depending on the best offer contract at the port of destination. This practice in the official records was especially prevalent during the years 1895-1940 and *"comercio a órdenes"* represented, as geographical destination records, between 25 and 35 per cent of total exports. It is well known that, at the end of the 1930s, statistical authorities made an estimation of the final geographical destination by trade partners included in *"comercio a órdenes".* This estimation was published in various *Anuarios Estadisticos Argentinos* between 1927 and 1940. We have, therefore, been able to include a series of *"comercio a órdenes"* weighted with the rest of the geographical distribution of exports for the years 1895-1913.[11]

3.- A double test of the accuracy of Argentine export figures

As mentioned in the introduction, a double test of official Argentine export statistics is used in order to obtain more robust results concerning the trends and causes

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[10] Our estimation is measured in pounds sterling but will be compared with the official figures, the Cortes Conde et al. (1965) data or the Della Paolera-Taylor GDP (for the export/GDP ratio in Figure 10) using the cross exchange rate between *pounds- peso fuerte-peso papel*. For the *peso fuerte-peso papel* we use the estimation of Alvarez (1929), pp. 122-23, offered by Dieguez (1972), p.346. Between 1863 and 1875, the official exchange rate between the *peso fuerte* and the pound sterling was 4.9 and from 1876 to 1881 it was 4.88. The *peso oro* had a fixed exchange rate of 5.00 from 1882 to 1914.

[11] The complete series of "*comercio a órdenes*" from 1895-1940 is offered by the DGEC (1958) p. XXI.

of their accuracy problems. We will use first, the partners' records to test both quantities and prices potential bias taking into consideration problems of comparability between bilateral trade statistics caused by transit and different coverage. Second, we will test official commodities unitary values bias using international prices. The objective of the use of both tests is to check the hypothesis of the unitary value bias with two independent tests in order to improve the reliability of the final methodology used in the reconstruction of a new series.

3.1 The partner records' Accuracy Index

This paper takes advantage of the singularity of international trade statistics in that they offer a double independent record of the same economic transaction. It is well known that the geographical assignment used to be the most problematic and unreliable part of the international trade statistics. But import records were usually more reliable than export geographical assignment records. Bilateral import duty discrimination at the border means that officials are more interested in the geographical origin of imports than in the destinations of exports. Following studies by Federico-Tena (1991) and Tena (1992), and Carreras-Badía (2008), we defend the comparison of trade records as a sound methodology to test accuracy, but taking into account the traditional distortions created by transit trade across *entrepôts*, differences in trade partners' coverage records, such as the previously mentioned classification of *"comercio a órdenes"* and, of course, the differences in c.i.f-f.o.b valuations in partners' records.

For this test we will use the import records of Argentina's main export trade partners before the First World War. These are mainly European countries and have some of the most highly respected statistics for unit values and "special trade" coverage accuracy through this period. This methodology accounts for prices and quantities and, in this case, it consists of comparing the total value of the Argentina's official exports (according to its own statistics) with the sum of these flows as registered by its partner countries' records as imports.

$$XAI_i = \frac{\sum_{i=1}^{N} X_{ij}}{\sum_{j=1}^{N} M_{ij}}$$

We employ official bilateral data in current US dollars from official trade sources of European and US countries[12] and contrast the official export records of Argentina by countries with the imports of the same flows recorded by the official statistics of the United Kingdom, the United States, France, Germany, Belgium, the Netherlands, Italy and Spain. These countries account for around 80-90 per cent of the geographical distribution of Argentina's total exports during the period. We have also included the series of *"comercio a órdenes"* from 1895 to 1913 assuming that this series reproduces the same distribution as the rest of exports, so the data for *comercio a órdenes* are included, taking into consideration only the percentage that went to the group of our eight main trade partners each year.[13]

Our "accuracy index" is the ratio of the total trade sum of exports (the i_{th} country) according to its statistics, including the aforementioned "*comercio a órdenes*" with that of the same flows according to the import statistics of its partner (j_{th} country). This ratio includes a transportation cost component, i.e., the difference between the c.i.f valuation of import records and the f.o.b valuation of exports. The percentage of transportation cost and insurance (the so-called "freight factor") exported mainly to European countries usually depends more on the commodity composition of trade than on its geographical distribution. In the Argentine case we need transatlantic freight rates of the different Argentine export products to their main European destinations. Most of the freight rates

[12] See Statistical Sources.

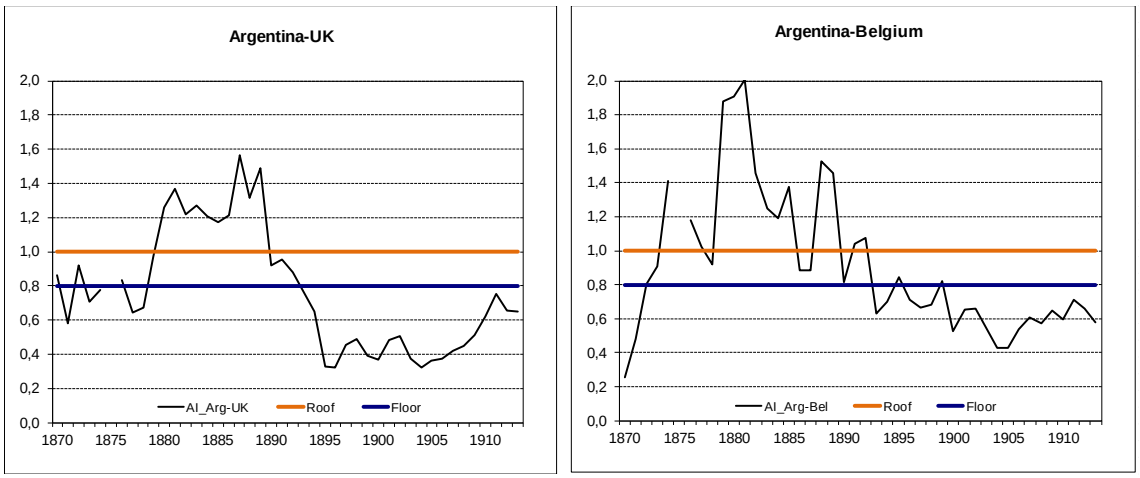
[13] We have preferred this neutral assumption to other riskier ones like that offered by Rayes (2011), Table C.5. Rayes takes into consideration the study of Ricardo Pillado published in the *Anuario de la Dirección General de la Nación* 1907, p.XXII and extends the average of the Pillado estimation for the years 1901-05 to the whole period 1895-1913. Apparently estimations are made by correcting the geographical export records assigned in the *"comercio a órdenes"* according to the records of four important agricultural products (wheat, linseed, maize and quebracho wood) from the import records of their most important trade partners.

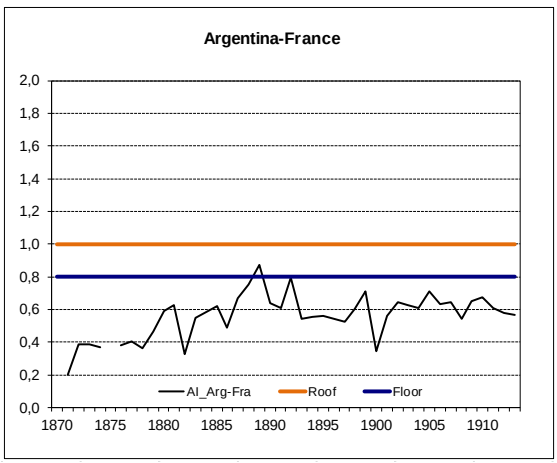
we found for different products are yearly, and correspond to Buenos Aires or alternative nearby South American transatlantic routes. So our freight factor estimation is driven by the changes in the composition of products and the evolution of freight rates and product prices during the period not weighted by geographical destination. Appendix 3 describes the methodology and includes details of sources for individual products and the final results of the estimated freight factor of Argentine exports that goes from a minimum of 16% to a maximum of 28%, averaging 19% for the period 1870-1913. In line with this, we do not offer freight adjustment for pairs of countries and only use the figure for the total export sum.

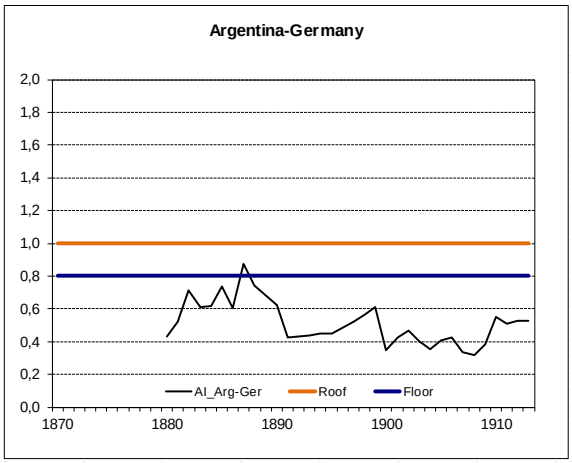
Accuracy indexes for pairs of countries are not freight-adjusted and are presented below with an interval from 80 to 100 (which would represent a freight factor of 20 per cent). Results over or below this interval are considered to represent an over or undervaluation of the export series respectively.

Figure 1

Argentine exports: geographical contrast by pairs of countries 1870-1913





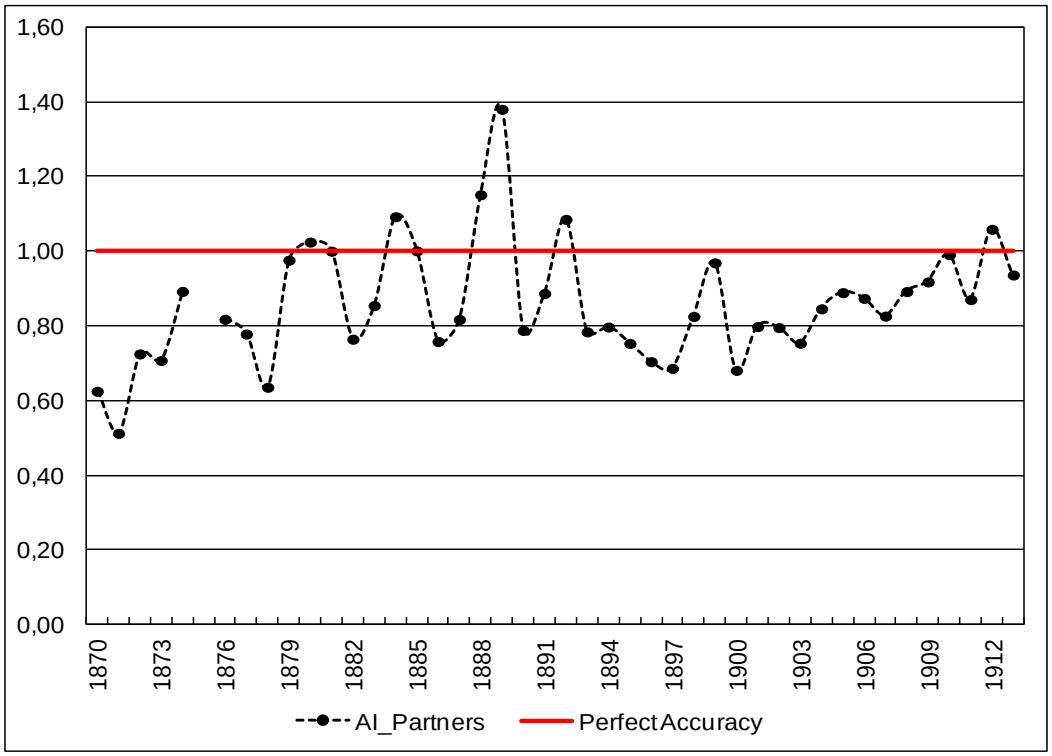


Sources: see official national statistics mentioned in text and references statistical sources.

In the 1880s, France and Belgium were, according to Argentinean records, the main destinations of exports but were overtaken by Britain and Germany, and later by the US, around the turn of the century. A first view of a general comparison by pairs of countries for Argentinean exports is offered in Figure 1. In the upper part of the figure we offer the accuracy indexes for the pairs of countries which represented the most common European destinations as transit ports, as is the case of British and Belgian destinations. As expected, both show a general overvaluation before the 1890s followed by a clear change to undervaluation positions during this decade and in the years around the turn of the century. This may be partially explained by the general undervaluation trend of the total export series (see Figure 2). In the lower part of Figure 1 we offer the accuracy indexes of the more distant countries such as France and Germany and, as expected, they offer a clearer undervaluation trend during the whole period. We analyze below which part of this cyclical bias is included in the total accuracy index and, in consequence, may also be partially explained by the general bias included in the total Argentinean official export records.

Figure 2

Argentine Partner Records Adjusted Accuracy Index 1870-1913



Sources: Appendix 1.

Figure 2 shows the first exercise comparing the total sum of Argentina's export records and the corresponding import statistics of its partner countries (mirror statistics). We present the total sum of official Argentinean exports compared with their partners' import data records in US dollars. These series are adjusted in two senses. First, we consider the *"comercio a órdenes"* as a proportion of the total sample of partner countries' records included and, second, we include the freight factor and tariff export correction by product. So we compare import records to f.o.b untaxed export records according to the weighted average for individual commodities freight factor and export ad valorem product tax offered in Appendix 1. As mentioned above, *"comercio a órdenes"* problems are relevant from 1895 onwards. We assume that the improvement of the accuracy index from that year is driven by some improvements in the official values more than by the inclusion of *"comercio a órdenes"* as we will prove later offering the accuracy test by prices. The accuracy index of the adjusted series shows a moderate but

persistent undervaluation in the official export series before 1889. The Baring crisis of 1889 offers an exceptional overvaluation probably produced by the fact that there was no revision of the "*valores de aforo*" of commodities such as wheat and wool in a depression year. As previously mentioned, the literature suggests some interpretations of this persistent undervaluation before the First World War. The undervaluation hypothesis is based mainly on the incentives of exporters to undervalue the *"valores de aforo"* to moderate tariff appearance. We also suggest that they were updated very infrequently for the same reason.[14] Official export tariffs were specific, that is they were paid based on the volume exported but were estimated and presented related with the price. Export lobbies wanted official values, "*valores de aforo*", to be lower than market prices so that taxation appeared greater than it was in reality. This allowed exporters to claim tax reductions. The literature agrees with this interpretation that the existence of "*valores de aforo*" produced undervaluation incentives in the official values. The results in Figure 2 would confirm this interpretation in general terms but show a more moderate undervaluation than expected. The trend showed in Figure 2 is nevertheless cyclical, showing that when the international price trend went down, as happened between 1870 and the early 1890s, if official values were not updated, the undervaluation trend reduced. From early 1890 to the turn of the century undervaluation increased moderately but from those years to the First War World the literature considers that *"valores de aforo"* were better updated and this would explain the improvement in the accuracy index.

3.2 The price Accuracy Index

As suggested in the previous section, it is necessary to confirm whether the accuracy of Argentina's exports is mainly related with their unitary values reliability. So our second approach would be to re-evaluate the official values of the main export products. Following the previous experience of Cortes Conde et. al (1965), we made a selection of the higher value crop and cattle products exported (wheat, maize, linseed, wool, leather, beef meat, mutton meat) representing around 80% to 90% of total exports

[14] See the discussion in the previous section based on the *Anuario Estadistico 1913*, and Cortes Conde et. al (1965).

(see Table 3). On one hand, we estimated official unitary values, summing values of different qualities of products divided by their respective quantities. Official sources were complemented with other secondary sources to avoid problems in the homogenization of the series because of changes in the quality of the products or typing errors.[15] On the other hand, we used two different independent sources for the estimations of international prices of the respective commodities: first, the well-known Sauerbeck series of international prices for primary commodities and, second, the unitary values (estimated by dividing the values and quantities) of the United Kingdom's records of imports from Argentina.[16]

In Appendix 2 we contrast Sauerbeck's commodity prices with UK-Argentina import prices. The former represent an average of international prices of primary products in London but we have some doubts about whether they represent Argentinean export commodity quality appropriately. We believe that the latter better reflect the average quality evolution of primary products exported by Argentina. From 1871, imports and re-exports in UK statistics were computed from declarations made by importers and re-exporters and not on the basis of prices supplied by dealers. Therefore Argentine imports in the UK have a different price to a similar product coming from another geographical origin with a different quality and freight cost.[17]

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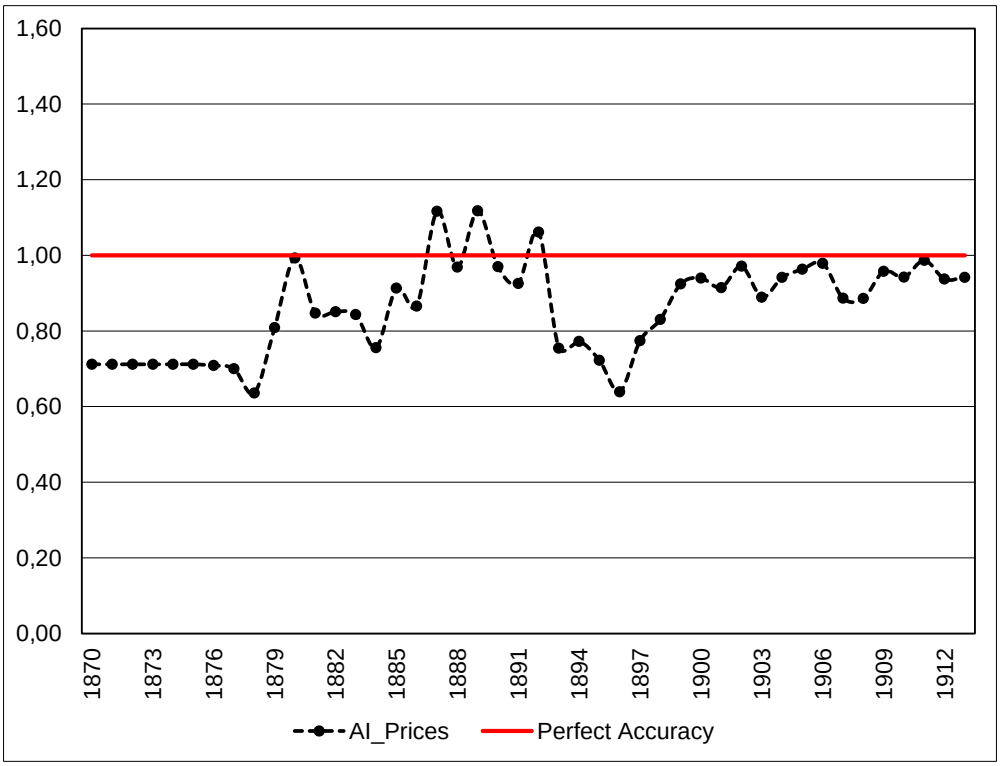
[15] We use official statistics from 1882 to 1892: *Estadística del Comercio Exterior y de la Navegación de la República Argentina* and from 1893 to 1915 *Anuario del Departamento Nacional de Estadística*. The homogenization of the retrospective series is from Latzina (1905), pp.180-228, and Tornquist (1919), pp. 167-172, and confirmed with Vazquez Presedo (1971) for values and Ferreres (2005) for quantities.

[16] The complete series of Sauerbeck's well-known international commodity prices is from Sauerbeck (1886, 1893,1909,1917). The UK import quantities and values from Argentina are taken from several years of the *Annual Statement of the Trade (*1874, 1878, 1892, 1896, 1900, 1904, 1908, 1912, 1915).

[17] Statistical unitary values of UK exports and imports were from 1871 "declared values", following current international recommendations: "In 1871, then, the trade accounts reached essentially their present form.…They were based on importers and exporters declarations of values as well as quantities, collected by Customs Officers at the ports, and transmitted to the Custom Statistical Office for compilation." See Stafford et al. (1953), p.291 and Imlah, (1958), p.44.

Figure 3

Argentine Price Sample Adjusted Accuracy Index 1870-1913

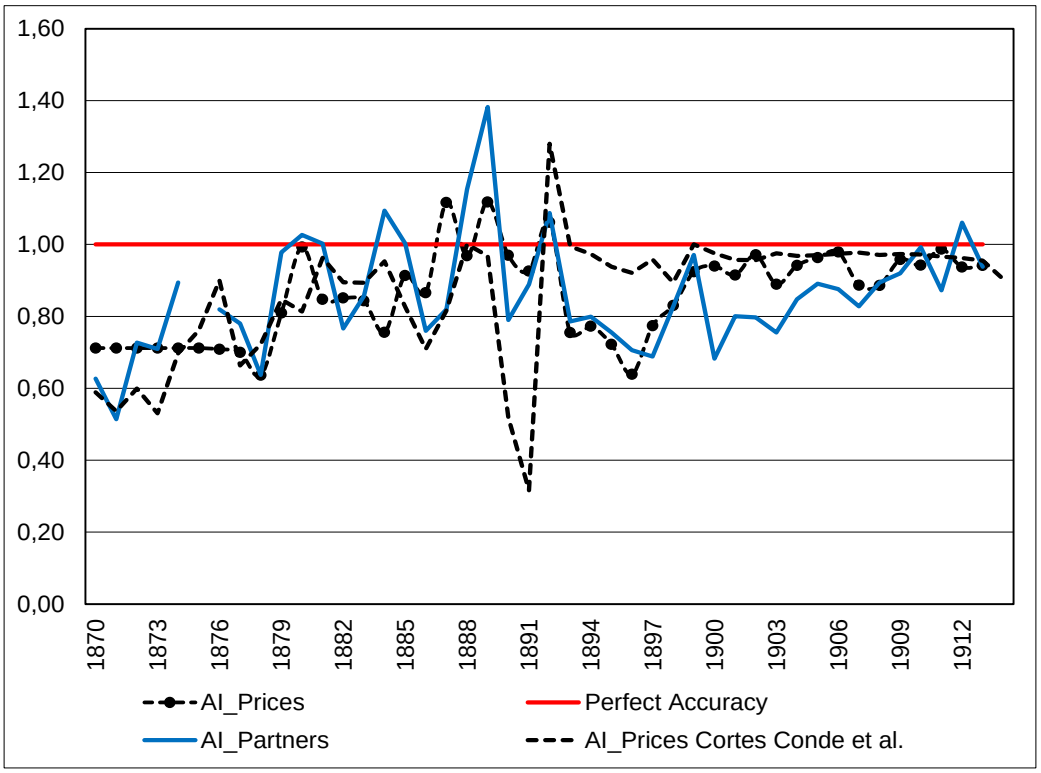


Sources: see Appendix 2.

We offer in the appendixes the annual freight rates (Appendix 3), the unitary values (Appendix 2), and the *ad valorem* export tax in Table 1 for each of the respective products. We include freight and tax adjustment used to translate the UK-Argentina c.i.f. import prices to the corresponding f.o.b. export prices at the Argentine border before taxes and contrasted with the corresponding official Argentine unitary values. Figure 3 shows the accuracy index of the price sample (adjusted) for the years 1876-1913. Apparently the undervaluation average (around 14%) and the cycles are quite similar to those in Figure 2. We can say, then, that both accuracy indexes constructed from different sources and procedures would confirm, on the one hand, and against what is assumed in the literature, that the Argentine export accuracy improvements did not arrive in 1892 but with the turn of the century. On the other hand, we see that undervaluation is cyclical but remains the main characteristic of the Argentine export series. However, it is necessary to delve deeper and contrast all the evidence.

Figure 4

Argentine Export Accuracy Index 1870-1913



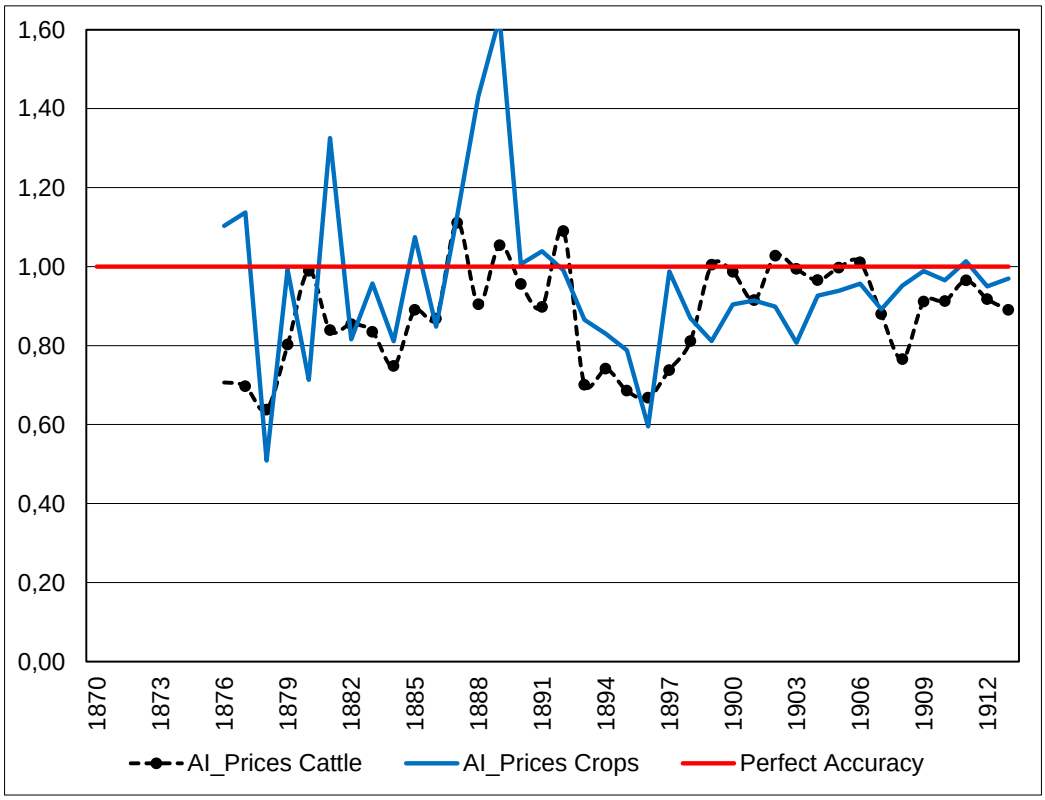
Sources: see Appendix 1 and Appendix 2 and Cortes Conde et al. (1965), p.42.

Figure 4 presents the accuracy indexes shown in Figures 2 and 3 together with that derived from the data offered in Cortes Conde et al. (1965). The latter uses a similar price sample but with domestic market prices (*valores de plaza*) instead of UK international prices. In general terms we get similar results in the undervaluation trend and cycles for the three series but these apparent similarities hide some relevant differences. First, our accuracy index based on Argentine-UK import price records compared with the accuracy index of the country partner records shows a higher undervaluation in the 1870s and 1880s, a similar undervaluation during the 1890s and a better accuracy index between the turn of the century and the First War World. Second, the Cortes Conde et al. (1965) accuracy index also shows a more moderate undervaluation for the 1870s and early 1880s but worse results for the second half of the 1880s with a heavy undervaluation of more than 60% in 1891. Third, Cortes Conde et al. (1965) offers quite accurate results from 1892 onwards because they assume that official prices of agrarian product (wheat, maize,

linseed, and other corns and flour), that represent more than 40% of total export value in those years, fit perfectly with domestic market prices (*"valores de plaza"*). As mentioned in the previous section they only re-evaluate cattle products from 1892 onwards. On the contrary, our price accuracy index shows a moderate but stable undervaluation from the turn of the century which appears to reduce progressively from 1906 onwards.

Figure 5

Price Accuracy Index (adjusted) of Crops and Cattle Exports 1870-1913



Sources: see Appendix 2 and Appendix 5.

Figure 5 shows the contrast in our price accuracy index between the crop and cattle commodities partially confirming the literature's presumption that official values of cattle were mainly responsible for the general undervaluation of the Argentine export series. Before 1892, increasing international prices in cattle commodities (see cattle commodities prices in Appendix 2) would moderate the previous undervaluation of this group. On the contrary, for the same years, the official values of the crop commodities, with a share lower than 10% of total exports, show a more erratic cyclical trend with

extreme overvalued years. From 1892, crops (whose share in total exports increased from a quarter in the 1890s to almost half at the turn of the century) had a more similar stable undervaluation than cattle commodities. Different behavior appears only from 1906 to 1913 when crop products improved their accuracy in contrast with a moderate increase of the cattle product undervaluation.

Table 1

Argentine tariff export rates

Beef		**Hides**		**Wool**	
Period	Tariff rate	Period	Tariff rate	Period	Tariff rate
1875-1876	0.06	1875-1876	0.07	1875-1876	0.06
1877-1883	0.07	1877-1884	0.06	1877-1884	0.07
1884-1890	free	1885-1887	0.02	1885-1887	0.03
1891-1897	0.04	1888-1890	free	1888-1890	free
1898-1899	0.03	1891-1906	0.04	1891-1906	0.04
1900	0.02	1906 onwards	free	1906 onwards	free
1901-1903	0.01				
1904	free				
1905	0.01				
1906 onwards	free				

The other products of our sample (mutton meat, linseed, maize and wheat) were free of tariffs throughout the period. Sources: For 1875-1904 see Latzina (1905) pp. 181-219. For the rest of the years see Conde et al (1965).

During the 1870s and early 1880s the main cattle commodities (skins, wool, salted meat) were taxed at around 7%, but from the second half of the 1880s tariffs were reduced to 2%-3% and increased again to 4% in the 1890s, until they were abolished in 1906 (see Latzina, 1905; and Cortes Conde et al., 1965). The overall undervaluation trend was probably caused by tariffs but, in addition, official values were not updated yearly. So the cyclical trend of international prices may help to understand the cyclical profile of the undervaluation. This would allow us to explain the fact that undervaluation persisted

after tariffs were abolished in 1906 and that duty-free crop products were also undervalued showing a similar trend to cattle commodities at least from 1890s onwards.

The above would prove reasonably that Argentine export series are cyclical but significantly undervalued. Two independent tests contrasting the official series with the sum of partner import countries' records and with a sample of international prices of the commodities exported adjusted by tariff and freights would show this similar undervaluation profile proving, reasonably, that the origin of the bias is caused by the official price undervaluation of the main commodities exported. Cattle commodities exports, as observed in the literature, appear to be more consistently undervalued than crop commodities. The former were tariff-taxed unlike the latter which were free-exported, suggesting that fiscal reasons influenced undervaluation because exporters' lobbies were interested in showing an apparently higher protection than the real one.

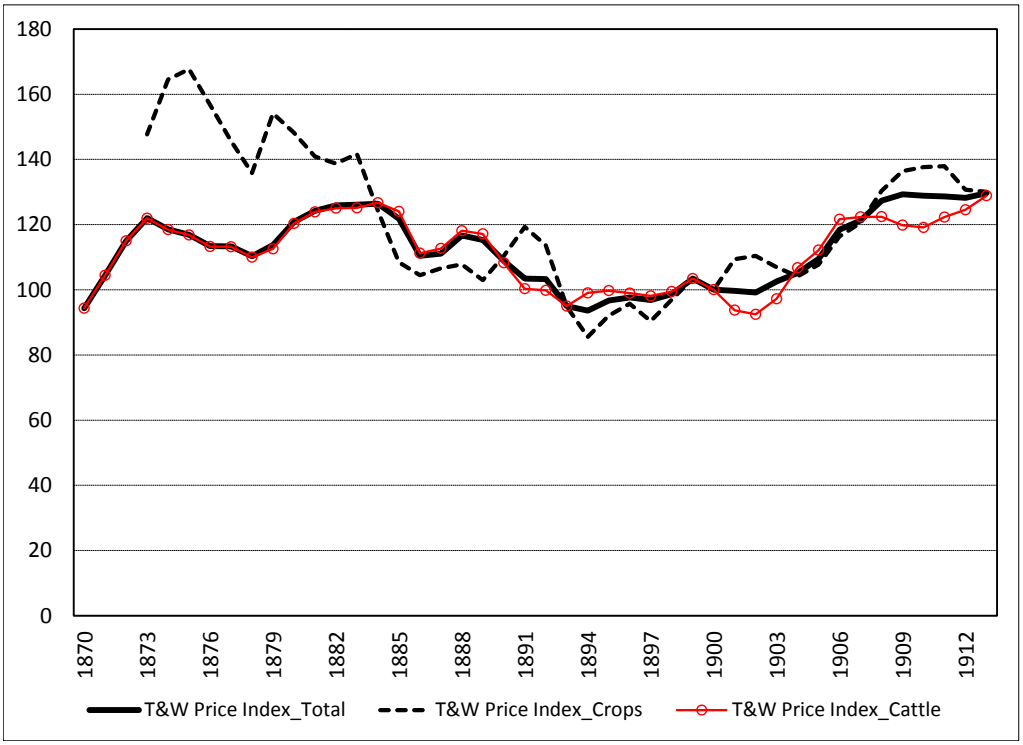
4.- Export price index and the Argentine export growth.

First, we present our new Argentine export f.o.b price index. The trade structure of Argentina changed significantly during the period and we believe it is important to elaborate an index number capable of incorporating these changes in the calculations. Therefore we propose a Paasche index number and use exported quantities, year by year, to weight the respective prices corrected by our estimated freight-tariff annual factor. In Figure 6, we compare the Total and the Crop and Cattle new price indexes of Tena and Willebald (henceforth T&W).

Figure 6

Argentine Export Price Index 1870-1930

(1899-1901=100)



Sources: see Appendix 4 and Appendix 5.

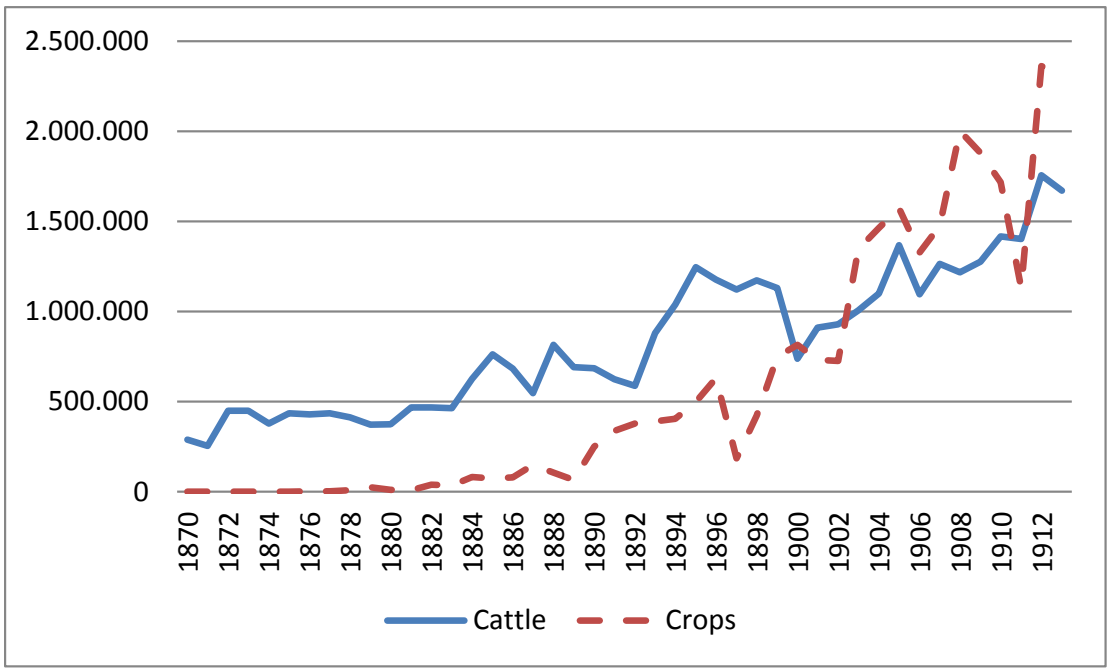
Figure 6 shows how Argentina's export prices experienced a decreasing trajectory until the mid-1890s and, from then, prices recovered significantly until the First World War. Crop prices reduction was more pronounced than cattle before 1895 but did not affect the total index because they represented a small share in total exports during that period (see Table 3). In the recent literature, the most extensively used export price index is that presented in Blatman et al. (2004) and Williamson (2000, 2002) based on Ford (1955) (henceforth BHW). Both indexes coincide in trends but the recovery of T&W index from the 1890s onwards meant overcome the levels previous to the First Globalization boom. In general, our Paasche price indicator offers a more stable evolution with a less pronounced decrease before 1895 and a slower subsequent increase than the previous index.

Table 2

Argentine Export Growth Rates 1870-1913 (constant prices)				
	Total exports c.i.f.	Total exports f.o.b.	Total exports f.o.b.	Cattle exports f.o.b.
	Blatman et al	Cortés Conde et al.	Tena-Willebald	Tena-Willebald Cattle
1870-1880	4.7	2.5	0.8	2.6
1880-1890	8.9	4.9	7.0	6.3
1890-1900	3.8	4.1	5.6	0.7
1900-1913	8.5	6.4	7.5	6.5
1870-1890	6.8	3.7	3.8	4.4
1890-1913	6.4	5.4	6.7	3.9
1870-1913	6.6	4.6	5.3	4.2

Figure 7

Argentine Cattle and Crops Exports Constant Prices (pesos oro) 1870-1913



Sources: see Appendix 5.

Comparative export growth offered by the new export volume series in Table 2 shows, apparently, a different growth trend than the Tena & Willebald, Cortes Conde et al. and Blatman et al. series. Discrepancies are enough to distinguish different patterns during the period. The Tena & Willebald series shows a 5.3 export growth between the moderate 4.6 of Cortes Conde et al. and the more dynamic 6.6 of Blatman et al. On the one hand, the export evolution of our series is very similar to that of Conde et al. during the first twenty years, but not in the next two decades, when the former indicates a better export performance than the latter. On the other hand, the Blatman et al. series shows more inconsistent higher growth during the period 1870-1890 than in the years 1890-1913, showing and Argentine *Belle Époque* export growth in advance that does not correspond with most of the evidence showed by the literature.

Table 2 and Figure 7 describe Argentine exports for the period 1870-1913 growing in two long waves separated by the "Baring crisis" at the end of the 1880s and a long readjustment in the 1890s. The first wave was led by traditional cattle products, which represented almost 90 per cent of the total exports in the 1870s, with wool as the main protagonist with a share of almost half of the total exports in the 1880s. The second wave was led by maize and wheat which were already important increasing export commodities even before the Baring crisis, but expanded faster following the international market dynamism of the First Globalization and their production cost reduction before the First War World. The data in Table 2 would show that the export expansion before the "Baring crisis" only appears as a moderate growth in the 1880s for both crops and cattle in the 1880s led by crops and that there was only a limited amount of dynamism of cattle exports in the 1870s, contrary to the suggested cattle frontier movement and later, by the military expedition in indigenous territory. The quantity of land used for crops increased by around 40 million hectares between 1867 and 1890 and this affected the most productive land in Argentina: *la pampa húmeda.* [18] Cattle frontier movement to less fertile territories partly explains the expansion of crops in more

[18] See Cortes Conde (1979), p.55. The end of geographical expansion, according to Di Tella and Zymelman (1967), was also important to understand the different agrarian export growth in relation with other countries such as Canada and Australia.

productive land in the 1880s and apparently also the disposal of more fertile land on which the export success of wheat between 1888 and 1894 was based, even if it was temporally supported, during the international crisis years, by the domestic currency drop.[19] This land frontier movement was followed by market expansion accompanied by the railway development and the reduction of Atlantic freight rates. Our data show that after the Baring Crisis in the early 1890s, finance problems apparently affected cereal exports as much as those of wool in the short run. However, through the decade of the 1890s these problems acted negatively mainly on cattle but not on wheat as shown by the dynamism of crop exports. The strong monetary depreciation of the Baring Crisis slowed down the entrance of new capital but, in fact, it was less dramatic for export performance than the literature would suggest.

Table 3

Argentine Main Export Commodities
Shares of total exports (corrected data). 5-year average

	1876-1879	1880-1884	1885-1889	1890-1894	1895-1899	1900-1904	1905-1909	1910-1913
Tallow	8%	6%	5%	4%	4%	4%	4%	4%
Animals	7%	6%	4%	3%	3%	3%	3%	3%
Beef	8%	7%	6%	8%	5%	5%	7%	10%
Mutton	0%	0%	2%	3%	4%	5%	3%	3%
Hides	17%	14%	14%	12%	8%	7%	6%	8%
Wool	49%	58%	51%	35%	37%	23%	19%	12%
Cattle	90%	90%	83%	65%	60%	47%	42%	40%
Linseed	0%	1%	2%	2%	4%	9%	9%	9%
Maize	1%	2%	6%	5%	10%	15%	14%	16%
Wheat	1%	2%	4%	17%	13%	21%	28%	19%
Crops	1%	5%	13%	24%	27%	44%	52%	44%
Sample on total exports	91%	95%	95%	89%	87%	92%	93%	84%

Sources: New series of products corrected by f.o.b. adjusted prices from Appendix 2 Table A.2.1. Tallow and animals corrected with total cattle prices adjusted.

[19] See Cortes Conde (1979), p.89-90 and real exchange rate index in Figure 7.

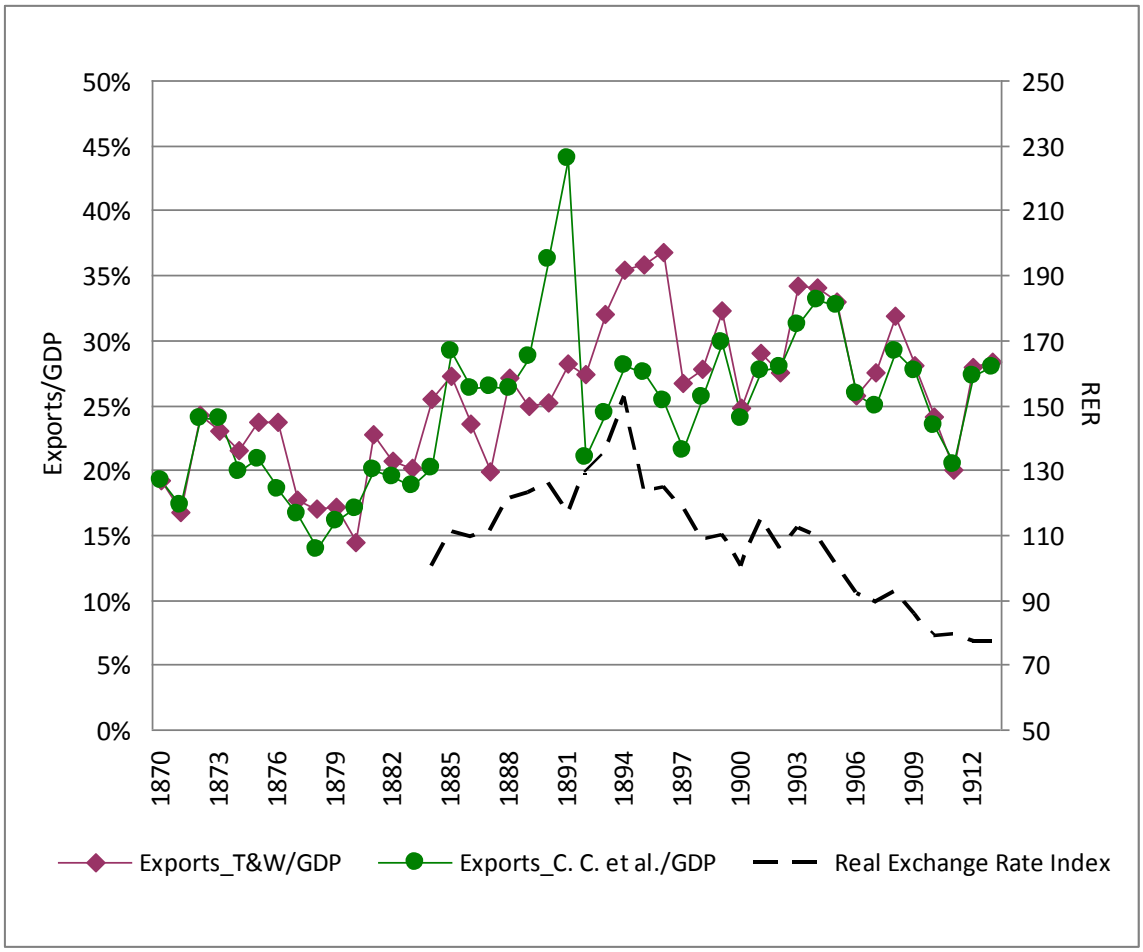
At the end of the 19th century the rapid development of cereal production took place alongside demographic change, immigration growth and capital flows that supported the extension of the railway network. Argentina's export commodity structure (see Table 3) shows this important transformation of the agrarian development clearly. In the 1870s and 1880s the traditional cattle products –wool, tallow, hides, live animals, and beef meat– account for more than 80% of total exports and it was only in the early 1890s when crop commodities, especially wheat, expanded for the first time, pushed by currency depreciation and the previous land expansion in the *"Pampa húmeda"*. The extraordinary expansion of the export share of wheat from 4% in 1885-89 to 17% in the period 1890-94 is striking in the context of the years immediately following the Baring Crisis. In parallel we can observe a significant fall in the share of the most representative export cattle commodities such as wool and hides. Despite this remarkable first expansion of crop exports, it was only after the turn of the century, in the period until the First War World, when crops led Argentine export growth. The export shares of wheat, maize and linseed increased rapidly during the first years of the new century and beef, pushed by the consolidation of transatlantic shipping's refrigeration technology, was mainly responsible for the last years of Argentina's export expansion. Our new estimation fits this historical context consistently, showing a better export performance during the *Belle Époque* years than the figures offered by Cortes Conde et al. (1965). It also indicates improved cattle, and especially meat-related, export performance before the First War World. Thirdly, it shows a moderate more dynamic long-run export performance than the literature and alternative series showed.

Finally, as we consider that the main problem of the official trade statistics corresponds to prices rather than quantities, we are able to correct the values of official data in current prices. We valued the exported volume of a sample of seven products with international prices, calculated the accuracy index and applied this correction to total export official data (in *pesos oro*) to obtain an adjusted export series in current prices. We calculated the Exports/GDP ratio to represent the relevance of external transactions in the

local economy and to evaluate the dynamics of Argentina's export-led growth strategy in the last third of the 19th century. [20]

Figure 8

Argentine Export/ GDP ratio, 1870-1913, current prices (*pesos oro*)



Sources: Appendix 5, Della Paolera-Taylor (2003), Maddison (2003), and Williamson (1999).

In Figure 8 we present our series (Exports_T&W/GDP) together with the "corrected" series derived from Cortes Conde et al. (1965). The main differences between

[20] GDP in current prices is available from 1884 onwards (Della Paolera & Taylor, 2003) and converted to *pesos oro* in line with Alvarez (1929), pp.115-120. For the previous period we discounted the movement in volume (Cortes Conde, 1994, for 1875-1883; Maddison, 2003, for 1870-1874) and prices (Williamson, 1999), assuming the CPI as a good proxy for the GDP deflator.

the ratios emerge when we try to explain the first wave of openness expansion. On the one hand, Cortes Conde et al. (1965) shows that the wave in the openness growth in Argentina would finish at the end of the 1880s coinciding with the credit crunch associated with the Baring Crisis. On the other hand, Tena-Willebald ratio growth is extended to the second half of the 1890s, which fits better with the depreciation of real exchange rate during the first half of 1890s. The real appreciation of exchange rate [21]during the second half of the 1890s seems to stop the export expansion in relation with the GDP. During the *Belle Epoque* years, Tena-Willebald export growth offers a more dynamic performance than both the official and the Cortes Conde series, but this is not the case for the export ratio that shows a contracted trend during these years. Argentine openness ratio twofold initial levels but the expansion would finish in the years of the turn of the century with a fluctuation ratio around 30%. This may be explained in a context of exchange rate appreciation partially because GDP expansion was based in a more diversified economy with larger internal markets and a relatively higher participation of non-tradable goods in the economy. By and large, our correction means accepting higher export levels and a better performance than the "standard" series and, at least partially, they show a more sensitive reaction to international conditions.

5 Conclusions

The present study has discussed the accuracy of official Argentine exports in order to reconstruct a new current and constant value series for the period 1870-1913. Based on the literature we have discussed the accuracy problems of the monetary units, geographical distribution and, especially, official export unit values. We have used empirical evidence to test the accuracy of quantities and value records, first, according to their import partners' records and, second, according to international market prices. The hypothesis of export price undervaluation bias is correct. We subsequently reconstructed a new Argentine export f.o.b values and price index using international prices valued in

[21] We use a simple indicator of the evolution of the real exchange rate (RER) as the ratio between the wholesale prices (Della Paollera & Taylor, 2003) and the nominal exchange rate.

pounds sterling which allows us to present a new proposal concerning Argentine export growth.

In relation to the causes of the accuracy problems of the export records, our results confirm the *undervaluation hypothesis.* On one hand, undervaluation is especially relevant during the turbulent 1885-1894 period probably because official and Cortes Conde et al. (1965) domestic prices are converted using an exchange rate which did not reflect the real depreciation of the paper peso. On the other hand, the statistical records of *valores de aforo* were lower than market prices because exporters were interested in showing an apparently higher protection to support political claims in favor of tax reduction. Cattle commodities were tariff-taxed unlike crop commodities which were free-exported; consistent with this our results show that unitary values of the former appear more consistently undervalued than those of the latter. Nevertheless, undervaluation was cyclical because when the international price trend fell, as happened between 1870 and the early 1890s, if official values were not updated, the undervaluation reduced. From the early 1890s to the turn of the century undervaluation increased moderately but from that period to the First War World the literature considers that *"valores oficiales"* were better updated and this would explain the accuracy index improvement.

The new series would offer a more dynamic export performance for most of the period than the literature and previous series showed. We confirm that Argentine exports through the period 1870-1913 grew in two long waves separated by the "Baring Crisis" at the end of the 1880s and a long readjustment in the 1890s. The first wave was led by traditional cattle products such as wool and the second wave was led by maize and wheat. Both commodities were already important, increasing export commodities even before the Baring Crisis but grew faster following the international market expansion and the increase in productivity before the First War World. On one hand, the Baring Crisis produced a strong monetary depreciation and slowed down the entrance of new capital that affected GDP more than export performance as shown by their respective growth ratios until the end of the 1890s. On the other hand, our figures show a more rapid export growth during the *Belle Époque* years than the figures offered by Cortes Conde et al.

(1965). This situation was caused by improved cattle, and especially meat-related, export performance. But despite this improved export performance, our figures would show that domestic growth rather than export growth was the leading factor during the *Belle Époque* years.

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Annual statement of the trade of the United Kingdom with foreign countries and British possessions compared with the four preceding years. Compiled in the Statistical Office of the Customs and Excise Department. Volume I. Several volumes with the same title for the years 1874, 1878, 1892, 1896, 1900, 1904, 1908, 1912, 1915.

DIRECCIÓN GENERAL DE ESTADÍSTICA DE LA NACIÓN, REPÚBLICA ARGENTINA (1958): *Anuario del Comercio Exterior de la República Argentina*, Buenos Aires.

OFFICER, Lawrence (2001): "Dollar-Pound Exchange Rate From 1791". Measuring Worth, 2010. URL: http://www.measuringworth.org/exchangepound/

On the accuracy of export growth in Argentina, 1870-1913

Appendix 1. Export partner records Accuracy Index

We used import records of the main export trade partners of Argentina before the First World War to compare the total value of Argentina's official exports (according to official or local statistics) with the sum of these flows as registered by its partner countries' records (United Kingdom, the United States, France, Germany, Belgium, the Netherlands, Italy and Spain) as imports (1870-1913). We also include the series *"comercio a órdenes"* from 1895 to 1913 assuming that they reproduce the geographic distribution of the rest of the exports. Consequently, the data for *comercio a órdenes* are included taking into consideration only the annual percentage for the group of our eight main trade partners. Our formula is the following:

$$XAI_i = \frac{\sum_{i=1}^{N} X_{ij}}{\sum_{j=1}^{N} M_{ij}}$$

Where,

XAI_i is the export partner records Accuracy Index of country *i* (Argentina in our case).

X_{ij}: is the value exported from country *i* to country *j*, with *j*=each one of the main geographical destination of exports of country *i* (United Kingdom, the United States, France, Germany, Belgium, the Netherlands, Italy and Spain).

M_{ij}: is the value imports records by country *j* from country *i*, according to official local records.

M_{ij}: is valued at international c.i.f prices. We have export tax and freight adjusted that prices to get f.o.b prices free of tax in Argentine border according to export tax and freight factor data offered Table 1 and Table A.3.1 respectively.

All data are expressed in US dollars. Sources are detailed in Sources.

For Argentine exchange rates we use different sources in accordance with the currency of export original data.

1870-1881: original *pesos fuertes* (implicit exchange rate in Board of Trade Foreign Countries, several years) and Officer (2001).

1881-1909: original data in pounds (Vazquez Presedo, 1971) and exchange rate from Officer (2001).

-1910-1913: original data in *pesos argentinos* (DGEN, 1958) and exchange rate from Dieguez (1972): 346.

Appendix 2. Price Accuracy Index

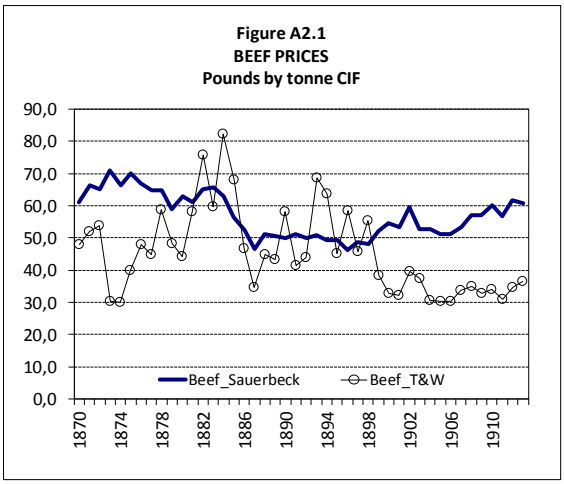
We re-evaluate the export records of Argentina's main commodities before the First World War to compare (the total value) of Argentina's official exports (according to official or local statistics) with the sum of the flows derived from the valuation of the official volume (quantities) export records at international prices (expressed in pounds). The previous literature used either domestic market prices *"valores de plaza"* (see Conde et. al, 1965) or the well-known Sauerbeck commodity price series (see Blatman, et. al, 2004). Following price demand theory we believe that the quality of Argentine commodities exported to high-income markets tended to be superior to that corresponding to local market goods and, in consequence, we assume that Argentine export prices were more related with international prices than with domestic ones.[22] For this reason, we work with two different series of international prices. On the one hand, we use prices derived from the extensive work of Augustus Sauerbeck on average commodity prices quoted on the London market. On the other hand, we use the declared import unit values from Argentina recorded by the Annual Statement of United Kingdom. We compare the evolution and consistency of both in Figures A2-1 to A2-7 below. The former, as mentioned above, was previously used for the estimation of Argentina's export price index in Blatman et. al (2004) (in c.i.f values). The latter, as far as we know, has not been used previously either in the estimation of the price accuracy index or in the estimation of Argentina's export price index. We consider the latter series as the best proxy to the international prices that were in fact obtained by Argentine exporters. We base our choice on the following arguments.

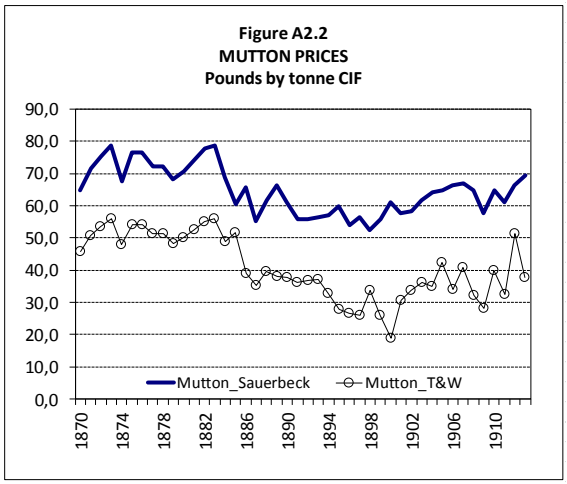
Sauerbeck´s prices constitute an average of commodities of different quality coming to the London market from different origins. From the supply side, the first globalization was a period with major changes in transport technology (refrigeration, as mentioned in the text, was incorporated in different countries at different stages) and in the agrarian production (fencing, cattle cross breeding). From the demand side, the geographical origin and the quality of commodities demanded by Britain changed significantly during this period with the rapid emergence of new suppliers and movements in local preferences (associated with increasing incomes). UK import declared values capture quality changes by geographical origin better than other official unitary values from other reputed continental trade records. Despite the fact that the United Kingdom was not permanently the main destination of Argentine exports, in the long run, it was the main market for most Argentine commodities. In consequence we assume that the United Kingdom's records of declared import unitary values capture differences in the quality composition of Argentine commodity exports better than the average proposed in Sauerbeck's series. Therefore, our general proposal is to use the unit values of the commodities imported by the United Kingdom from Argentina according to British records as a reference and, when the

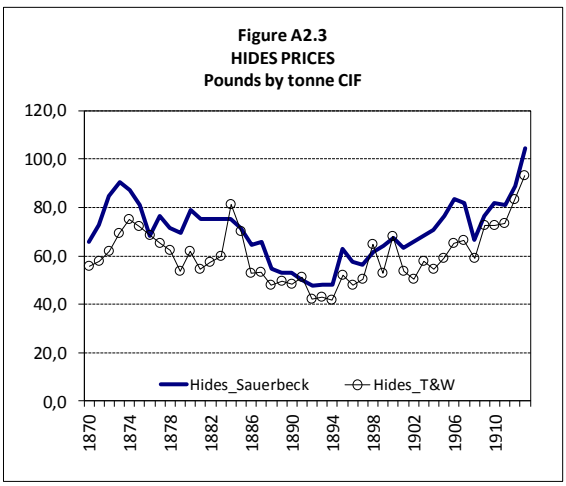
[22] The model that predicts that products of better quality will be exported is presented in "Shipping the good apples out" (Borcherding & Silberberg, 1978). It has been discussed for a long time as part of price demand theory. Assuming shipping cost is equal in good and bad quality products, high quality products will become relatively cheaper in foreign markets. For a recent discussion, see Hummels & Skiba (2004).

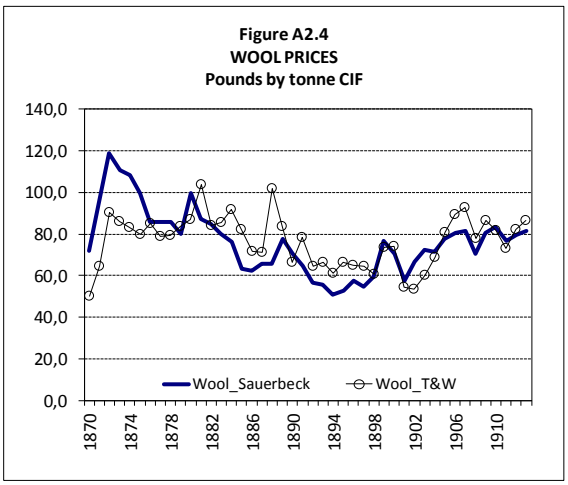
data are not available for the whole period, we complete the series by splicing our import unit values with the evolution reported in Sauerbeck´s prices.

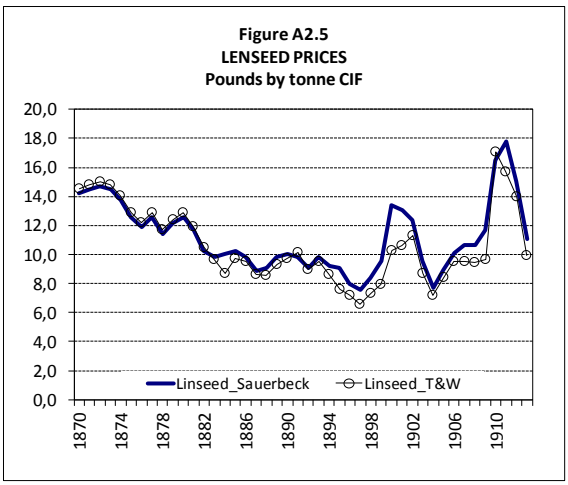
We plot and compare Saurebeck's prices and the import unit value proposed as international prices in this research (T&W's prices) to illustrate the differences. The similarities between crop prices and hide prices, on the one hand, and the huge divergence between cattle prices, on the other hand, throw light on the differences in terms of quality and the impact of technological changes by type of commodity. In those commodities where the quality is relatively homogenous between varieties (cereals) or they are easily gathered (cereals, hides, wool), the price convergence is a more predictable process. However, in the case of perishable commodities, such as the different types of meat, and with notorious differences in terms of quality, the price differentials can be longer-lasting.

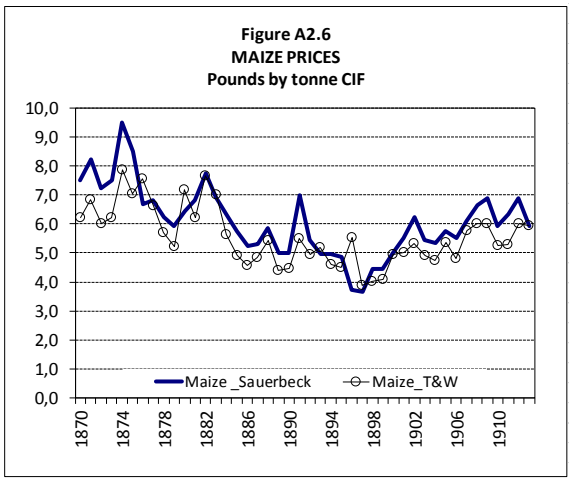


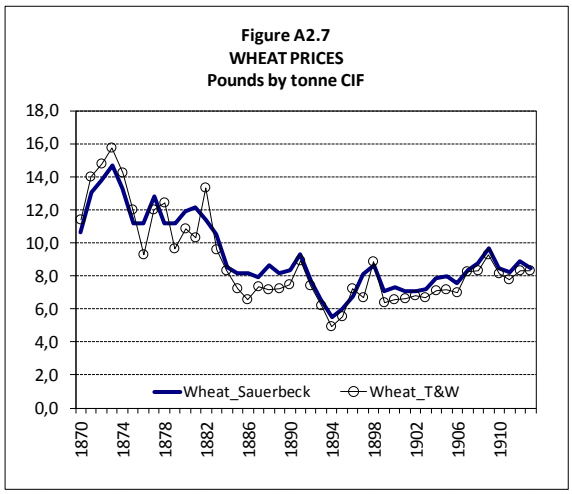












Finally, international prices are declared c.i.f import prices in UK records. We have export tax and freight adjusted that prices to get f.o.b prices free of tax at the Argentine border according to export tax and freight factor data offered in Table 1 and Table A.3.1 respectively.

We define the price accuracy index (*PAI*) of country *i* as:

$$PAI_i = \sum_{j=1}^{N} \frac{P_{ij} * Q_{ij}}{P_{mj} * Q_{ij}}$$

Where,

PAI is the ratio between the volume of the good *j* valued at the border of country *i* (F.O.B. value of commodity exports) and the volume of the same products valued with the corresponding prices in the international markets discounting freight and insurance costs. Both prices are expressed in

pounds. The commodities considered are: beef, mutton, hides, wool, wheat, maize and linseed and they represented, according to official data, 82 per cent of total exports of the period.[23]

Q_{ij} is the volume of good *j* according to the trade statistics of the country *i*.

P_{ij} is the price of good *j* according to the trade statistics of the country *i* (expressed in pounds).

P_{mj} is the international price of good *j* (expressed in pounds).

Q_{ij} and (implicitly) P_{ij} were derived from official statistics –*Estadistica del Comercio Exterior y de la Navegación de la República Argentina* (1882-1892) and *Anuario del Departamento Nacional de Estadística* (1893-1913), but we require some criteria to homogenize retrospective series and we take as reference Latzina (1905): 180-228, and Tornquist (1919): pp 167-172. We confirm these data with Vazquez Presedo (1971) for values and Ferreres (2005) for quantities.

P_{mj} is export tax and freight adjusted to get f.o.b prices free of tax in Argentine border. It was derived from the unit value of the United Kingdom imports quantities and values from Argentina which are taken from several years of the Annual Statement of the Trade (1874, 1878, 1892, 1896, 1900, 1904, 1908, 1912, and 1915). Information is not available for some commodities for the whole period and we complete the series with the movement in Sauerbeck's prices: beef (1870-1874); mutton (1870-1882); linseed (1870-1881); maize (1870-1874); and wheat (1870-1874).

Table A2.1
Commodity export f.o.b prices (tax and freight adjusted) converted to *pesos oro* per ton at fixed exchange rate)

	Beef	Mutton	Hides	Wool	Linseed	Maize	Wheat
1870	156.64	128.65	269.05	223.10	66.12	27.25	50.53
1871	163.48	136.48	277.72	286.90	66.03	29.66	62.01
1872	168.53	142.32	298.63	407.94	66.80	25.48	65.22
1873	72.43	146.98	334.02	382.91	65.16	26.24	69.48
1874	74.43	124.20	363.46	374.01	62.47	34.62	63.08
1875	117.11	158.74	330.62	343.30	57.84	31.17	53.39
1876	149.50	158.60	311.83	363.79	54.39	32.51	41.22
1877	129.04	138.41	292.52	329.03	56.99	28.19	53.26
1878	192.93	147.16	281.76	335.64	52.09	24.13	55.26
1879	149.47	135.84	242.36	352.85	55.54	21.81	42.81
1880	130.33	138.60	279.41	369.03	57.47	30.15	48.28

[23] Figures present a minimum of 73 percent (1876) and a maximum of 92 percent (1887).

1881	186.19	147.00	245.40	436.76	52.77	26.14	45.82
1882	264.78	161.23	260.54	355.03	46.28	33.06	59.30
1883	197.29	169.70	271.93	362.72	42.63	30.23	42.72
1884	310.99	188.41	370.95	394.95	39.39	24.66	37.16
1885	252.08	206.20	333.99	362.81	44.46	21.31	32.25
1886	165.31	151.60	250.88	315.82	43.24	19.64	29.37
1887	110.30	132.56	253.84	316.68	38.36	20.98	32.34
1888	160.39	157.53	231.85	459.85	38.27	23.51	31.87
1889	154.76	149.21	240.00	383.54	41.36	18.58	31.64
1890	227.05	151.21	233.00	303.90	42.89	18.52	32.44
1891	145.64	143.71	236.51	333.13	43.68	23.92	38.19
1892	164.33	152.37	195.46	273.76	39.38	21.20	31.67
1893	278.67	155.10	199.69	290.30	43.18	22.23	27.06
1894	257.23	133.89	195.93	270.37	38.54	19.28	20.62
1895	176.74	113.52	244.95	293.12	34.20	19.19	23.64
1896	237.19	107.26	224.30	290.05	31.97	22.96	31.59
1897	182.86	104.58	234.25	284.36	29.81	16.49	30.40
1898	232.47	144.74	301.35	256.03	32.46	16.98	39.18
1899	154.58	109.04	248.72	325.97	34.93	16.47	26.91
1900	130.78	74.26	319.02	329.69	46.53	20.08	28.14
1901	128.13	131.66	251.28	241.14	49.09	22.07	29.03
1902	163.92	146.04	235.92	233.06	52.52	23.98	30.39
1903	154.87	158.92	271.28	265.70	39.48	21.67	29.44
1904	123.16	152.50	256.46	301.50	31.58	20.53	31.36
1905	121.07	188.44	276.37	359.13	38.09	23.48	32.04
1906	122.52	148.17	307.27	402.58	43.79	21.65	31.40
1907	138.09	180.89	325.43	429.55	43.70	26.09	37.22
1908	145.01	139.09	286.61	358.79	43.92	27.57	37.92
1909	134.75	119.17	352.40	399.23	45.00	27.75	42.73
1910	140.45	177.64	353.56	383.37	81.10	23.89	37.61
1911	131.17	144.14	358.04	341.72	74.46	24.16	35.66
1912	147.54	236.03	407.63	373.77	63.60	26.15	35.95
1913	156.27	168.41	457.21	398.55	44.77	25.91	36.63

Source: see Sources and References.

Appendix 3. Commodities Freight rates and freight factor

We estimated freight rates + insurance ratio on commodities c.i.f prices for the main export commodities of Argentine exports used in our price index in order to convert c.i.f prices in London to f.o.b prices at the Argentine border. Freight rates evidence on commodities' transatlantic shipping is scarce so we made diverse estimation assumptions. The commodities freight rates estimated refer to the same products used in the estimation of our price index in Appendix 4: **maize, wheat, wool, linseed, mutton, beef and hides**. For **maize** we used annual grain freight rates from Buenos Aires to Rotterdam 1888-1913; for **wheat** the annual wheat freight rate from Buenos Aires to London 1887-1913; for **wool** the annual freight rates of wool Melbourne-London freight rates adjusted by the ratio of Buenos Aires/Melbourne wheat differential; for **linseed** the same as for wheat; for **mutton,** frozen meat, mutton & beef= 0.375 pence per lb in Argentina in 1910 and according to the evolution of the Wellington-London mutton 1883-1899 freight rate, we interpolated the series from 1899 to match the 1910 benchmark; for **beef**, the beef freight rate from Buenos Aires to London (see Vazquez Presedo(1979), p.189;) which, in 1883, was: 2.5 pence per lb; 1910: Chilled Beef = 0.6875 pence per lb, and frozen meat, mutton & beef= 0.375 pence per lb. The beef freight rate from 1883 to 1910 was estimated according to the evolution of the Wellington-London mutton 1883-1899. Taking into consideration the rapid refrigeration technological advances developed from the late 1890s, we interpolated the series from 1899 to match the 1910 benchmark. Finally, for **hides** we know the punctual freight rate from Buenos Aires-Montevideo to London in 1872 = 225 pence per ton and we moved onwards according to the Buenos Aires to Rotterdam grain freight index. From the 1880s backwards we used the East American Grain Index offered in Mohamed-Williamson (2004) Table 2, p.182. The freight rates mentioned, if not specified, came from Angier, E. A.V. (1920): *Fifty Years of Freights 1869-1919*, published by Fairplay, London.

For insurance we assume a fixed 2% insurance in 1900 moved backwards with the respective shipping freight rates. A 2% insurance factor in 1900 based on Simon (1960, p.659). Other sources also appear to agree that 2% seems a reasonable long-term equilibrium premium for most of the commodities. Moreover, insurance risk premium is also very sensitive to exogenous war and maritime blockades also increase the risk involved in shipping (as shown by the freight rates) and to endogenous decrease of risk incorporated by technological improvements as that shown by refrigeration technology at the turn of the 20th century or that shown in shipping textiles packaging on mid-19th century transatlantic routes. [24]

[24] The high risk for shipping frozen meat in the 1890s showed insurance percentages around 4% and 5% but rapid technological improvements in refrigeration technology changed this figure to 2% for beef at the turn of the century ("El problema del seguro tuvo también su evolución favorable. Tratandose de un riesgo nuevo, el premio era altísimo al comienzo entre 4% y 5 % del valor transportado, que bajo al 2 con la entrada del nuevo siglo", Vazquez Presedo (1973), p.189). See Figure 5 p.19 in Llorca-Jaña (2011) on the reduction of insurance from 3.5% to 2% in transatlantic British cotton exports in the 1850s because of technological improvements in shipping packaging.

In the tables below we offer our estimates of freight rates. The seven Argentine export commodities freight ratios were used in Appendix 3 to transform c.i.f prices in f.o.b prices for the respective commodities prices and in the estimation of our Argentine export price index.

Table A3.1

Transatlantic freight rates of main Argentine export commodities

	Beef £ per ton	Mutton £ per ton	Hides £ per ton	Wool £ per ton	Linseed £ per ton	Maize £ per ton	Wheat £ per ton
1870	23.81	12.99	0.74	6.75	1.01	0.91	1.01
1871	28.81	15.71	0.89	8.17	1.22	1.11	1.22
1872	30.35	16.55	0.94	8.61	1.28	1.16	1.28
1873	32.41	17.68	1.00	9.19	1.37	1.24	1.37
1874	29.32	15.99	0.91	8.32	1.24	1.13	1.24
1875	24.69	13.47	0.76	7.00	1.04	0.95	1.04
1876	24.69	13.47	0.76	7.00	1.04	0.95	1.04
1877	28.29	15.43	0.87	8.02	1.20	1.09	1.20
1878	24.69	13.47	0.76	7.00	1.04	0.95	1.04
1879	24.69	13.47	0.76	7.00	1.04	0.95	1.04
1880	26.23	14.31	0.81	7.44	1.11	1.01	1.11
1881	26.75	14.59	0.83	7.59	1.13	1.03	1.13
1882	25.00	13.64	0.77	7.09	1.06	0.96	1.06
1883	23.15	12.63	0.72	6.56	0.98	0.89	0.98
1884	23.15	12.63	0.58	5.34	0.80	0.72	0.80
1885	21.12	11.52	0.56	5.11	0.76	0.69	0.76
1886	17.36	9.47	0.56	5.11	0.76	0.69	0.76
1887	18.81	10.26	0.54	4.96	0.90	0.67	0.90
1888	15.91	8.68	0.59	5.40	0.87	0.73	0.87
1889	15.91	8.68	0.56	5.11	1.00	0.75	1.00
1890	14.47	7.89	0.56	5.18	1.08	0.87	1.08
1891	14.47	7.89	0.64	7.33	1.33	0.85	1.33
1892	11.57	6.31	0.52	6.46	1.10	0.78	1.10
1893	11.57	6.31	0.44	4.60	0.83	0.73	0.83
1894	11.57	6.31	0.37	3.84	0.95	0.84	0.95
1895	9.89	5.39	0.41	3.94	0.90	0.74	0.90
1896	10.13	5.52	0.46	3.88	0.84	0.68	0.84
1897	8.68	4.73	0.55	3.90	0.64	0.56	0.64
1898	7.23	3.95	0.59	7.09	0.92	0.70	0.92

1899	7.23	3.95	0.48	5.23	1.16	0.98	1.16
1900	7.15	3.90	0.50	4.55	1.08	1.06	1.08
1901	7.07	3.86	0.48	4.10	0.86	0.65	0.86
1902	6.99	3.81	0.48	5.99	0.68	0.58	0.68
1903	6.91	3.77	0.49	5.37	0.79	0.65	0.79
1904	6.83	3.72	0.53	5.61	0.88	0.74	0.88
1905	6.75	3.68	0.54	4.93	0.72	0.70	0.72
1906	6.67	3.64	0.52	4.25	0.67	0.49	0.67
1907	6.59	3.60	0.57	4.79	0.72	0.52	0.72
1908	6.52	3.55	0.60	4.55	0.59	0.49	0.59
1909	6.44	3.51	0.66	4.62	0.56	0.45	0.56
1910	6.37	3.47	0.58	3.66	0.51	0.48	0.51
1911	4.95	2.70	0.56	3.56	0.56	0.49	0.56
1912	5.38	2.93	0.60	5.91	1.13	0.90	1.13
1913	5.15	2.81	0.58	4.98	0.96	0.76	0.96

Source: see Sources and References.

Appendix 4. Export Price Index

We created an indicator to represent the movement of export prices at the border of the exporter country; i.e. we propose an index of free on board (f.o.b.) prices.

Our reference figure is the import unit value derived from the values and quantities of commodities imported by the United Kingdom from Argentina recorded as declared values in several volumes of the *Annual Statement of the Trade of the United Kingdom* (see discussion on quality goods of declared values in Appendix 2). We converted all figures to pounds sterling per ton from different price measures and specific types of the corresponding commodities. These figures represent c.i.f. prices, which were adjusted for export tax and freight to get f.o.b. prices free of tax at the Argentine border according to export tax and freight factor data offered Table 1 and Table A.3.1.

The trade structure of Argentina changed significantly in this period and we considered it was convenient to elaborate an index number able to incorporate these changes in the calculations. Therefore we proposed a Paasche Index Number and used exported quantities, year by year, to weight the respective prices corrected by our estimated freight factors. Prices were previously converted to *pesos oro* at a fixed rate of 5 *pesos oro* per pound (the implicit exchange rate used in the Annual Statement of the Trade surveys). Our formula is the following:

$$XPI_{t,1899\text{-}1901=100} = \frac{\sum_{j=1}^{N} P_{j,t} * Q_{j,t}}{\sum_{j=1}^{N} P_{j,1899\text{-}1901} * Q_{j,t}}$$

Where,

$XPI_{t,\ 1899\text{-}1901}$ is the Export Price Index of country *i* (Argentina in our case) in the period *t* considering the 1899-1901 average as the base period.

$P_{j,t}$ is the international price of commodity *j* in period *t*.

$Q_{j,t}$: is the volume exported of commodity *j* (according to official Argentine data) in the period *t*.

We compare our *XPI* with the export price index standard in the literature derived from Blatman et al. (2004) and Williamson (2000, 2002) based on Ford (1955) (henceforth BHW). This BHW index (1900=100) is a chained Laspeyres index that includes the Sauerbeck six commodities prices –hides/skins, linseed, maize, meat, wheat and wool (Merino)–. They are valued c.i.f on the London market and cover the whole period. They use four weight sets (average participation by exported commodity): 1880-1884, 1898-1902, 1920-1924, and 1934-1938. They construct four series, one per period of

weighting, corresponding to: 1860-1894, 1885-1917, 1908-1934 and 1925-1950. These series have ten overlapping years and the connection between them consists of splicing pairs of series considering 90 per cent of the first one and 10 per cent of the second, 80 per cent of the first one, 20 per cent of the second and so on, year by year, until 100 per cent of the series is used with most recent weights. Trends are similar.

Argentina's export prices experienced a decreasing trajectory until the mid-1890s and, from then, prices recovered significantly until the First World War. In accordance with our indicator, this recovery meant achieving the levels previous to the First Globalization boom, although this was not the case for the BHW index. In general, our indicator shows a more moderate evolution, especially before 1885, with a less pronounced decrease and a slower increase. As a consequence of this more stable evolution,[25] the T&W indicator resulted 1.6 per cent higher than the BHW index throughout the period (average) and 5.6 per cent from 1880 to 1913.

[25] The standard deviation of the BHW index exceeds that of the T&W index by 60 per cent.

Appendix 5. New Series

Table A5.1
Export of commodities: official and corrected data in current prices, corrected data in constant prices (*pesos oro*) and Export Price Index, Total, Cattle and Crops (1899-1901=100)

	Pesos oro			Export Price Index		
	Official (current prices)	Corrected (current prices)	Corrected (constant prices, 1899-1901)	Total	Cattle	Crops
1870	30,326,400	42,604,991	45,155,442	94.4	94.4	--
1871	27,092,000	38,061,043	36,449,936	104.4	104.4	--
1872	47,424,000	66,625,088	57,940,857	115.0	115.0	--
1873	47,559,200	66,815,028	54,776,554	122.0	122.0	147.7
1874	44,688,800	62,782,457	52,968,641	118.5	118.4	164.5
1875	52,187,200	73,316,819	62,746,089	116.8	116.8	167.7
1876	48,256,000	68,108,832	60,060,688	113.4	113.2	156.8
1877	44,917,600	64,196,498	56,641,308	113.3	113.2	145.7
1878	37,648,000	59,192,472	53,681,484	110.3	110.0	135.8
1879	49,524,800	61,223,853	53,816,702	113.8	112.5	154.1
1880	58,572,800	58,992,176	48,822,361	120.8	120.4	148.2
1881	58,136,000	68,621,590	55,250,998	124.2	123.9	140.9
1882	60,590,400	71,201,871	56,544,467	125.9	125.0	138.8
1883	61,453,600	72,886,433	57,799,629	126.1	125.1	141.7
1884	68,255,200	90,323,270	71,455,856	126.4	126.7	124.2
1885	84,167,200	92,168,181	75,686,176	121.8	124.0	108.4
1886	70,075,200	80,947,535	73,280,062	110.5	111.2	104.5
1887	84,708,000	75,890,921	68,311,259	111.1	112.6	106.5

1888	100,453,600	103,715,480	88,928,265	116.6	118.1	107.8
1889	123,000,000	110,049,859	95,473,907	115.3	117.1	102.9
1890	101,160,800	104,308,940	95,815,856	108.9	108.3	110.4
1891	103,563,200	111,868,643	108,171,922	103.4	100.3	119.3
1892	113,755,200	107,155,926	103,773,917	103.3	99.8	113.7
1893	94,411,200	125,134,302	131,796,204	94.9	95.0	94.8
1894	102,034,400	132,129,587	141,125,432	93.6	99.1	85.6
1895	120,473,600	166,795,675	172,484,515	96.7	99.7	92.0
1896	117,197,600	183,373,395	187,760,612	97.7	99.0	95.7
1897	101,514,400	131,150,042	135,464,990	96.8	98.1	90.4
1898	134,284,800	161,727,043	163,872,560	98.7	99.4	97.0
1899	185,546,400	200,804,970	194,160,878	103.4	103.4	103.4
1900	155,335,800	165,296,452	165,296,452	100.0	100.0	100.0
1901	167,350,000	182,970,083	183,557,539	99.7	93.7	109.4
1902	179,426,500	184,759,006	186,343,222	99.1	92.5	110.4
1903	220,193,400	247,622,682	241,403,161	102.6	97.2	106.9
1904	263,443,100	279,796,021	266,114,581	105.1	106.8	104.1
1905	321,689,600	334,019,253	305,009,260	109.5	112.1	107.7
1906	291,963,800	298,303,136	251,818,853	118.5	121.7	116.4
1907	296,715,200	334,686,839	275,954,362	121.3	122.4	120.5
1908	365,021,700	412,135,951	323,721,663	127.3	122.4	130.3
1909	396,282,200	413,747,541	319,971,147	129.3	119.8	136.4
1910	388,471,200	412,431,149	319,996,373	128.9	119.1	137.7
1911	341,681,600	346,216,350	269,127,435	128.6	122.3	137.9

1912	501,144,800	534,795,092	417,113,162	128.2	124.5	130.7
1913	517,764,000	549,771,267	424,034,088	129.7	128.8	130.1